Physicians' and nurses' retention of knowledge and skill after training in cardiopulmonary resuscitation

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Physicians and nurses in a community hospital who successfully completed the standard 1-day training program in basic life support cardiopulmonary resuscitation (CPR) were retested 6 and 12 months after training. Their perceptions of their knowledge of and skill in CPR were recorded along with an account of the roles they had taken in CPR incidents. The physicians and nurses initially had the same level of knowledge of CPR, but the physicians learned significantly more and retained it longer. After training, the nurses participated much more in CPR incidents, limiting themselves to basic life support functions. The physicians' participation, however, remained at about the same level and was limited to advanced life support functions. By 12 months after training the scores in both groups were similar to the pretraining scores, which suggests that practice with feedback is necessary during the 1-year period before retraining and recertification. It may be that the two groups require different training programs.

Les médecins et infirmières d'un hôpital communautaire qui avaient complété avec succès le programme standard de formation d'un jour en techniques de réanimation cardiopulmonaire (RCP) ont été soumis à de nouveaux examens 6 et 12 mois après le cours. La perception qu'ils avaient de leurs connaissances et leur habileté en techniques de RCP ont été enregistrées ainsi que le rôle qu'ils avaient jouer lors d'incidents de RCP. Au début, les médecins et infirmières possédaient le même niveau de connaissance en RCP, mais les médecins ont appris significativement plus et l'ont retenu plus longtemps. Après le cours de formation les infirmières participèrent à beaucoup plus d'incidents de RCP, se limitant à des fonctions de soutien fondamental de la vie. La participation des médecins demeura à peu près au même niveau et se limita à des fonctions de soutien de la vie au stade avancé. Douze mois après le cours de formation, les cotes des deux groupes étaient semblables à celles qui avaient été enregistrées avant le cours. Ceci indique que des pratiques et des mécanismes de correction sont nécessaires durant la période d'un an qui précède le nouvel entraînement et la recertification. Il est possible que les deux groupes aient besoin de programmes de formation différents.

We report changes in the knowledge and skill of registered nurses and physicians following successful completion of the standard 1-day training program approved by the Canadian Heart Foundation in basic life support cardiopulmonary resuscitation (CPR). We also report on the accuracy of participants' perceptions of their knowledge and skill and some differences between the two groups.

Methods

To establish baseline levels registered nurses and physicians in a community hospital completed a multiple-choice test on knowledge of CPR, performed CPR on a recording "ResusciAnne" for 1 minute and provided a self-assessment of their knowledge of and skill in basic life support CPR. At the end of the course the 19 nurses and 20 physicians who completed the program again answered the test, performed CPR on the recording "ResusciAnne" and estimated their knowledge and skill.

Participants were contacted 6 months and 12 months after training and asked to complete the three measures of CPR knowledge, skill and self-assessment. After 6 months 12 nurses and 13 physicians participated, and after 12 months 12 nurses and 6 physicians participated. Attrition was unrelated to the CPR course or the professional job. Reasons for attrition included maternity leave, extended sick leave, and leaving the job or the area. Data were analysed from as many individuals as were available at each collection point.

In order to monitor the effects of training on participants' conduct we tabulated the roles taken by health professionals in all CPR incidents in the community hospital before training and during the 12 months following the program.

Results

Table I displays the average scores of knowledge and numbers of errors made while performing CPR at various times. There was significant overall improvement after the training program. The physicians had a significant decrease in knowledge and skill after 6 months. The nurses had a significant decrease only in knowledge after 6 months, but the mean number of errors in their performance of CPR increased considerably (from 11 to 34). After 12 months the levels of knowledge and skill in both groups were similar to the pretraining levels. This analysis was conducted by paired *t*-tests of the knowledge scores and on square roots of the performance error scores.

To assess the differences between the average scores

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of the doctors and nurses we used two sample *t*-tests for the knowledge scores and the square roots of the performance error scores. The physicians' knowledge scores were very similiar to the nurses' before training and at 12 months after training. However, the physicians learned significantly more than the nurses and retained a significant edge 6 months after training. The physicians made fewer errors in performing CPR than did the nurses at each assessment point; however, only immediately after training was the difference statistically significant.

We compared the participants' perception of their knowledge and skill with the test scores at the time of training and 6 months later. No direct relation between perception of knowledge and actual knowledge was found for either group. At 6 months after training an unexpected but significant ($p = 0.035$) relation was noted between the nurses' perception of their CPR skill and both their score on the test of knowledge and the number of errors made in performance. The physician's perception of their knowledge of CPR agreed with their scores of knowledge ($p < 0.05$), but they overestimated their skill at performing basic life support CPR.

The participants had taken roles in 21 CPR incidents during the 12 months after training. Prior to training the nurses had taken 28 roles in 10 incidents, performing functions of both basic life support and advanced life support, and the physicians had taken 9 roles in 7 incidents, again performing both types of functions. After training the pattern of roles changed dramatically. The nurses' participation increased to 92 roles in 11 incidents, but they limited themselves almost entirely to basic life support functions. The physicians' participation remained at about the same level (13 roles in 5 incidents), but they limited themselves to advanced life support functions.

Discussion

The significant decrease in knowledge and skill 6 months following training and the further decrease in basic life support skills after 12 months suggest that a 1-year period before retraining and recertification is too long. An opportunity in the interim for practice, with feedback and a review of course material, might prevent this dramatic decrease. We expected that the longer professional training of physicians, with its emphasis on pathophysiology and diagnosis, would produce higher levels of skill and better retention of knowledge. The lack of significant differences between the physicians and nurses in long-term retention of knowledge and skill suggests that practice with feedback and not professional training would have the greatest effect on retention.

Following training, nurses in this study restricted their participation in CPR incidents to basic life support functions. This may explain why their actual knowledge and skill agreed with their perceptions of their skill in performing CPR. On the other hand, the physicians were only able to predict their knowledge, as they seldom performed basic life support CPR in actual situations. The accuracy of a person's awareness of his or her knowledge and skill is important, for a perceived need for education is a powerful motivator in voluntary programs such as training in basic life support CPR.

Table I—Changes in knowledge of and skill in performing basic life support cardiopulmonary resuscitation*

Group	Before training	After training: Immediately†	After training: 6 mo‡	After training: 12 mo
Physicians				
Knowledge	75 (n = 20)	91 (n = 20)	86§ (n = 13)	78 (n = 6)
Skill	62 (n = 20)	6 (n = 20)	32‖ (n = 13)	48 (n = 6)
Nurses				
Knowledge	75 (n = 27)	84 (n = 19)	77¶ (n = 12)	77 (n = 12)
Skill	69 (n = 26)	11 (n = 19)	34 (n = 12)	58 (n = 11)

*Measured as percentage of correct answers and number of errors respectively.
†Improvement from before training significant at $p < 0.001$ in all categories.
‡Decrease from immediately after training significant at §$p < 0.006$, ‖$p < 0.01$ and ¶$p < 0.02$.

Conclusions

These results suggest the need for continued close examination of the basic life support CPR training program. The content of programs should perhaps differ for physicians and nurses by building on their previous knowledge and professional training, but the final evaluation should demand a standard level of achievement for the two groups. Motivation of health professionals to attend training programs could be increased by including some advanced cardiac life support training for physicians and including information on the administration of medication for nurses to correspond with the roles the two groups take during CPR incidents. Opportunities for review and practice of the knowledge and skill would assist participants in maintaining their competence and would make their perception of their knowledge and skill more accurate.

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Pursuit of knowledge

Ardent desire for knowledge, in fact, is the one motive attracting and supporting investigators in their efforts; and just this knowledge, really grasped and yet always flying before them, becomes at once their sole torment and sole happiness. Those who do not know the torment of the unknown cannot have the joy of discovery, which is certainly the liveliest that any man can feel.

—Claude Bernard (1813–1878)